I CLAIM:

1. In a process liquid filtration apparatus embodying a filter bed for removing particulates from a process liquid having a predetermined specific gravity, a filter bed comprised of super-buoyant particles having a specific gravity lower than one half of the predetermined specific gravity of the process liquid.

2. The filter bed according to Claim 1, wherein said super-buoyant filter bed particles are loosely compacted and a majority of their mass floats on top of the process liquid to be filtered.

3. The filter bed according to Claim 1 wherein said mass of super-buoyant filter particles is sufficiently loosely compacted to enable backwashing of the filter bed as the mass of filter particles floats on a body of process liquid.

4. The filter bed according to Claim 1, wherein said super-buoyant filter bed particles are selected to be a specific size within the range of 0.1 micron and 25.4 mm.

5. The filter bed according to Claim 1, wherein said super-buoyant filter bed particles are selected to be a specific size within the range of 1.0 and 25.4 mm for a coarse filter.

6. The filter bed according to Claim 3, wherein said mass of super-buoyant filter particles expands in volume from about 10 to 30% during said backwashing to thereby free captured particulates and washing them out of the filter bed.

7. The filter bed according to Claim 1, wherein said super-buoyant filter bed particles are selected from a group consisting of plastic, glass or ceramic.

8. The filter bed according to Claim 1, wherein said super-buoyant filter bed particles are selected to be a specific size within the range of 0.1 micron and 1.0 mm for a finer filter.

9. The filter bed according to Claim 1, wherein said super-buoyant filter bed particles are selected to be a specific size that will require a process fluid pressure of from approximately **20** to 150 psi for process fluid to flow through said filter bed.

10. The filtration apparatus according to Claim 1, wherein said filtration apparatus includes an ultraviolet reactor, said process liquid is caused to flow through said ultraviolet reactor to be exposed to a high flux of ultraviolet radiation to induce the formation of hydroxyl ions in the process liquid which combine with ionized metals in said process fluid to form insoluble precipitate particles, whereupon said process liquid bearing said precipitated particles is pumped through said filter bed to remove said precipitated particles.

11. The method of filtering contaminated particulates from a process liquid having a predetermined specific gravity to enable re-use of the filtered and de-contaminated process liquid, comprising:

a) drawing particulate contaminated process liquid from a source thereof;

b) applying pressure to the particulate contaminated process liquid drawn from said source;

c) delivering an initial quantity of said pressurized particulate contaminated process liquid into a filter chamber having an inlet port, an outlet port and a composite filter bed formed by distinct super-buoyant filter particles having a specific

gravity lower than one half that of the said predetermined specific gravity of said process liquid whereby said filter bed has the capacity to float on top of said process liquid;

d) continuing the delivery of said pressurized particulate contaminated process liquid into the inlet port of said filter chamber to effect displacement of said composite mass of distinct filter particles comprising said filter bed from adjacent said inlet port to adjacent said outlet port where displacement of said filter bed is terminated;

e) continuing the delivery of said pressurized particulate contaminated process liquid into said filter chamber after displacement of said filter bed has terminated, whereby continued delivery of said pressurized process liquid into said filter chamber results in said process liquid being forced to flow through the now stationary composite mass of distinct super-buoyant filter particles whereby said particulates are captured and retained by said composite mass of distinct filter particles; and

f) discharging filtered and de-contaminated process liquid from said filter chamber through said outlet port and delivery to at least one storage reservoir.

12. The method according to Claim 11, wherein said filtered and de-contaminated process fluid is selectively delivered to one of two storage reservoirs having inlet and outlet ports.

13. The method according to Claim 11, wherein a pump is provided having an inlet port connected to said source of particulate contaminated process liquid and an outlet port connected to the inlet port of said filter chamber.

14. The method according to Claim 11, wherein the pressure applied to said particulate contaminated process liquid ranges selectively from approximately **20** to 150 psi.

15. The method according to Claim 11, wherein particulates larger in size than the interstices of said super-buoyant filter bed are filtered from said process liquid by the mechanism of surface filtration wherein said larger particulates adhere to the upstream surface of said filter bed and form a crust thereon through which smaller particulates penetrate.

16. The method according to Claim 11, wherein particulates smaller in size than the interstices of said filter bed are filtered from said process liquid by the mechanism of depth filtration wherein said smaller particulates are captured and retained in the interstitial spaces in the filter bed between the distinct filter bed particles.

17. The method according to Claim 11, wherein at least a portion of said filtered and de-contaminated process liquid discharged from said filter chamber is selectively directed into a backwash reservoir for storage and selective re-use in backwashing said filter bed to remove accumulated particulates therefrom.

18. The method according to Claim 11, wherein the flow rate of process fluid exiting the filter chamber is sensed, measured and compared over time with the flow rate of process liquid exiting the filter chamber at the commencement of a filtering cycle to determine the resistance to the flow of process liquid through said super-buoyant filter bed and upon reaching a predetermined resistance level correlated to a specific low rate of flow of said process liquid a backwash cycle is initiated to remove particulates adhering to said filter bed.

19. The method according to Claim 18, wherein when said predetermined resistance level is reached, delivery of said particulate contaminated process liquid to and from said filter chamber is temporarily discontinued, the particulate-laden process liquid

in said filter chamber is drained into a reservoir whereupon said composite filter bed is displaced to adjacent said inlet port of the filter chamber following which clean non-contaminated process liquid is sprayed onto the composite super-buoyant filter bed to backwash therefrom particulate contaminants previously filtered from said process liquid, then draining the filter chamber of particulate contaminated backwash process liquid, and thereafter re-initiating delivery of particulate contaminated process liquid to said filter chamber to commence another filtering cycle.

20. The method according to Claim 19, wherein backwashing of said filter bed is initiated automatically when said super-buoyant filter bed has been displaced to a predetermined level within said filter chamber adjacent said inlet port whereupon spraying of clean non-contaminated process liquid onto said filter bed is initiated.

21. A liquid filtration apparatus for removing particulates from a process liquid having a predetermined specific gravity, comprising:

a) a source of said particulate laden process liquid;

b) a filter chamber having an inlet port for receiving said particulate laden process liquid and an outlet port for discharging filtered process liquid therefrom;

c) a composite filter bed within said filter chamber formed by distinct super-buoyant filter particles having a specific gravity lower than one half that of the said predetermined specific gravity of said process liquid;

d) means for conveying particulate laden process liquid into said filter chamber from said source thereof for passage through said composite super-buoyant filter bed for separation of said particulates from said process liquid and discharge of filtered process liquid through said outlet port of said filter chamber; and

e) means communicating with said outlet port for conveying said filtered process liquid away from said filter chamber for re-use as a non-contaminated process liquid.

22. The liquid filtration apparatus according to Claim 21, wherein a storage reservoir is provided having an inlet port to selectively receive filtered process liquid from said filter chamber and an outlet port for selectively delivering filtered process liquid back to said filter chamber for backwashing said composite filter bed to remove particulates therefrom.

23. The liquid filtration apparatus according to Claim 22, wherein a storage reservoir is provided connected to said inlet port of said filter chamber to selectively collect particulate contaminated process liquid from said filter chamber following backwashing of said composite filter bed to remove said particulates.

24. The liquid filtration apparatus according to Claim 21, wherein control means are provided selectively operable to control the delivery of particulate contaminated process liquid to and from said filter chamber and to control the discharge of filtered process liquid from said filter chamber.

25. The liquid filtration apparatus according to Claim 21, wherein means are provided within said filter chamber for preventing said super-buoyant filter bed particles from being discharged from said filter chamber.

26. The liquid filtration apparatus according to Claim 21, wherein said filter chamber is provided with a normally closed vent tube communicating the interior of said filter chamber to the atmosphere and selectively opened when particulate contaminated

process liquid is drained from said filter chamber following backwashing of said composite filter bed to remove contaminating particulates therefrom.

27. The liquid filtration apparatus according to Claim 21,wherein at least one backwash spray head is mounted within said filter chamber, means connecting said at least one backwash spray head to the outlet port of said filter chamber to convey filtered process liquid from said filter chamber to said at least one backwash spray head, and means interposed in said means connecting said at least one spray head to said filter chamber selectively operable to initiate conveyance of said filtered process liquid to said at least one spray head when said super-buoyant filter bed is so clogged by particulates that the rate of flow of said filtered process liquid drops below a selected predetermined flow rate, whereby said filter bed is backwashed to remove said particulates therefrom.

28. The liquid filtration apparatus according to Claim 27, wherein said means responsive to said reduced flow rate from said filter chamber includes a sensor that measures said flow rate, a plurality of solenoid operated valves, a filtered process liquid reservoir, a pump and an electronic control system interconnecting said sensor, valves, reservoir and pump.

29. The liquid filtration apparatus according to Claim 21, wherein dual filter chambers are provided connected in a parallel flow filtration system configuration.

30. The liquid filtration apparatus according to Claim 29 wherein control means are provided operable to retain one filter chamber in filtering operation while the filter bed of the other filter chamber is being backwashed, whereby said particulate contaminated process liquid may be filtered continuously without interruption.

31. The liquid filtration apparatus according to Claim 28, wherein dual filter chambers are provided connected in a parallel flow filtration system configuration, and said electronic control system comprises an embedded microprocessor operable to monitor said sensors and to turn "ON" and "OFF" in a timely manner all of the pumps and valves required to operate the dual filter chamber apparatus.

32. The liquid filtration apparatus according to Claim 21, wherein dual filter chambers are provided connected in a series flow filtration system configuration wherein a first of said filter chambers is the primary filter chamber and a second of said filter chambers is the secondary filter chamber.

33. The liquid filtration apparatus according to Claim 32, wherein the outlet port of said primary filter chamber is connected to the inlet port of said secondary filter chamber, the outlet port of said secondary filter chamber is selectively connected to deliver filtered process liquid to said primary and secondary chambers to effect backwashing of the composite filter beds in said dual chambers, and an electronic control system is provided interconnecting said series flow filter chambers whereby the filter beds in said series-connected filter housings may be composed of particles sized to filter coarse particulates from process liquid passing through said first filter chamber and composed of particles sized to filter finer particulates from the process liquid admitted to said secondary filter chamber to thus maximize the total amount of contaminant particulates removed by liquid filtering apparatus.

34. The liquid filtration apparatus according to Claim 33, wherein a hydroxl ion-generating ultraviolet reactor is interposed between said primary and secondary filter chambers, said filtered process liquid discharged from said primary filter chamber flows

through said ultraviolet reactor and is exposed to a high flux of ultraviolet radiation in flowing therethrough which induces the formation of hydroxl ions in the process liquid which combine with ionized metals in the process liquid to form insoluble precipitate particles which flow into the secondary filter chamber to be captured by said composite super-buoyant filter bed and filtered from the process liquid flowing through said secondary filter chamber.

35. The liquid filtration apparatus according to anyone of Claims 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33 or 34, wherein said composite super-buoyant filter bed particles are selected from a group consisting of plastic, glass or ceramic and selected to be a specific size within the range of 0.1 micron and 25.4 mm.

36. The liquid filtration apparatus according to anyone of Claims 21, 29 or 32, wherein each said filter chamber is symmetrical about a vertical axis, said inlet and outlet ports are coincident with said vertical axis, said composite super-buoyant filter bed is initially contained within said filter chamber adjacent said inlet port and buoyantly floats upwardly on said process liquid to adjacent said outlet port by the process liquid admitted into said chamber through said inlet port and floats downwardly on the surface of said process liquid when said process liquid is drained from said filter chamber in preparation of backwashing said composite filter bed and subsequently floats upward during said backwashing cycle.